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| 09/280,268      | 03/29/1999  | ANNE E. MILLER       | 42390.P6147         | 5522             |

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EXAMINER

DEO, DUY VU

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1765

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DATE MAILED: 05/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/280,268

Applicant(s)

MILLER ET AL.

Examiner

DuyVu n Deo

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1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 and 26-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 26-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 7, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farkas et al. (US 5,773,364) and Farkas (Oxidation and Etching of the W in CMP Slurries).

Farkas describes a slurry comprising: an aqueous suspension of one or more abrasive species (claimed liquid and abrasive); ammonium cerium nitrate as etcher/oxidizer species, which would produce cerium ions; a pH increasing substance such as ammonium hydroxide (col. 3, line 21-25; line 64-col. 4, line 5, line 27-29, line 47). Unlike claimed invention, Farkas doesn't describe the polishing parameters such as pH, and chemical concentration in the slurry. Farkas also shows in his article of "Oxidation and Etching of the Tungsten in CMP Slurries" wherein table 1 and 2 shows different oxidizing agent concentrations and their pHs are run with their respective CMP rate and etch rate. The slurry also contains 3 wt% of abrasive of alumina. Silica-based slurry is also conventional and known to one skill in the art for polishing tungsten and metal (pg 25-31). Also it is well known to polish metal with an acidic solution, such as a pH <4 and dielectric layer with a basic solution, a pH >7 (please see Skrovan and Beyer references cited below). Therefore, it would have been obvious at the time of the invention for one skill in the art to determine the optimum polishing parameters including pH, concentration of chemicals

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and other components in the slurry through test runs, which would also depending on the type of material being polished.

Referring to claim 7, since the above slurry comprising the same component as that of the claimed invention, it would be also environmentally green.

3. Claims 6, 8, 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Farkas et al. (US 5,773, 364 and "Oxidation and Etching of W in CMP Slurries") as applied to claim 1 above, and further in view of Brusie et al. (Electrochemical Approach to Au and Cu CMP Process Development).

Unlike claimed invention, Farkas doesn't describe having glycine in the slurry. Brusie teaches a slurry for metal material wherein glycine, such as 1 or 2% is added in the slurry (pg 179, 180). It would have been obvious for one skill in the art to add glycine because Brusie shows that glycine increases the dissolution rate of copper metal in the slurry.

Referring to claim 6, adding glycine would also change the pH of the slurry. The amount of glycine shows in the examples of Brusie would be enough to increase the pH of the slurry above 1.5. Since the pH of the slurry for metal is known to one skill in the art to be below 4 (please see Skrovan and Beyer references cited below), the amount of glycine, to be added, would be obvious to one skill in the not to increase the pH above 4 depending on the material being polishing.

4. Claims 10-13, 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farkas et al. (US 5,773, 364 and "Oxidation and Etching of W in CMP Slurries") as applied to claim 1 above, and further in view of Grumbine et al. (US 6,083,419).

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Using corrosion inhibitor (suggested by Farkas in col. 3, line 24), such as BTA, is well known to one skill in the art. Grumbine shows using corrosion inhibitor including BTA in table 1 and col. 5, line 27-30. Even though he doesn't describe the corrosion inhibitor concentration is in molar. His suggested concentration of 0.001-2.0 wt% would overlapped claimed 0.002-0.005 molar. The concentration of corrosion inhibitor would have been obvious to one skill in the art to determined through test runs in order to achieve an optimum concentration that polish metal with an anticipation of an expected result.

5. Skrovan et al. (US 5,916,819) in col. 5, line 20-25; Beyer et al. (US 4,944,836) in col. 5, line 25-55: shows that it is well known to polish metal with an acidic solution, such as a pH <4 and dielectric layer with a basic solution, a pH>7.

***Response to Arguments***

6. Applicant's arguments filed 3/14/02 have been fully considered but they are not persuasive.

Applicant's showing that in col. 2, line 37-44, Farkas describes that ammonium salt used doesn't contain potassium, or similar mobile ions which can diffuse readily through dielectric materials is acknowledged. Referring to applicant's argument that Farkas teaches against using cerium ions because it is a similar mobile ions as that of the potassium (which would be readily diffuse through dielectric layer); this is found not persuasive because there is no evidence to show that this is the case. Even it is the case, this affect would not provide a serious problem that it can't

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be used since Farkas teaches that ammonium cerium nitrate still can be used (col. 3, line 64-col. 4, line 3).

Referring to applicant's argument that pH showing in table 1 and 2 of Farkas doesn't overlapped the claimed pH, which is 1.5-3 is acknowledged; the pH for polishing metal is well known to one skill in the art to be  $<4$  (please see Skrovan and Beyer) ; therefore, the pH of the solution would have to be determined through routine experimentation depending on the type of material being polished in order to obtain the optimum pH for the polishing process.

Applicant's argument that Brusie teaches away from using glycine because it creates a very high, uncontrollable removal rates observed during polishing is found not persuasive. As shown in Brusie, this affect is not created from the glycine itself but from the reaction of water soluble Cu-glycine complex with peroxide. The combined method doesn't describe using peroxide. Therefore, one skill in the art would use glycine because Brusie teaches that it increases the dissolution rate of Cu metal in the slurry.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the slurry is for polishing copper) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, the inhibitive affect of BTA would work on the Cu or W, since they're all metal, and depend on its concentration in the slurry.


***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD  
May 15, 2002

  
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